Babcock & Wilcox

a McDermott company

Power Generation Group

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June 14, 1990

Intermountain Power Project
Department of Water & Power
City of Los Angeles
P.O. Box 111, Room 658
Los Angeles, CA 90051

Attn: Mr. J.W. Scofield

Re: Intermountain Power Project
B&W Ref: RB-614/615
Subject: Burners

Gentlemen:

From late 1986 to date, B&W and IPP have progressed through a series of design modifications to improve the structural integrity and life of IPP's burners. This letter is written to summarize B&W's current assessment of the condition of these burners and to discuss actions planned by B&W for the remainder of IPP's burner warranty (warranty expires April 1991).

During the recent one week Spring outages, B&W provided an experienced burner design specialist (Mr. David Oyler) to thoroughly inspect all 96 burners and to guide field forces in upgrading slip seal casings (seal rings between the burners and furnace walls). All 96 slip seal casings were replaced using a new casing design which allows for greater thermal expansion and flexibility.

Also during the outages, all 96 burners were thoroughly inspected and repaired, as necessary. A copy of Mr. Oyler's summary report (dated 5/15/90) and detailed worksheets are attached for your information.

B&W still maintains that the temperatures these burners are being exposed to are within normal use limits for the respective materials. The main problem to date has been one of effectively dealing with thermal expansion, not with avoidance of metal loss. The design modifications made thusfar by B&W have greatly reduced the incidence of structural failures by allowing limited movement between key components.

Cosmetically, there are many burner components which were once flat but are now wavy, however, this condition does not affect burner operation or effective life.

To respond to IPSC's concerns that burner registers may eventually tilt excessively with respect to the furnace wall, B&W took measurements on each of the 96 burners as a benchmark for future outage inspections. We see no evidence at this time to back up IPSC's concerns, but will reserve final judgement until future outage inspections are completed.

Note that B&W is also planning for Mr. Oyler to be on-site for IPP's Fall-90 and Spring-91 outages to re-inspect burners and re-assess effectiveness of the previous upgrades.

During the March 90 unit 1 outage, I reviewed burner metal alarm temperatures and recommended to IPSC that they reduce the alarm temperatures on the coal pipes to 1050F (because of the close proximity of the thermocouple to carbon steel components). This is not expected to impact current cooling air flow settings since the measured coal pipe temperature on out-of-service burners seldom goes over 1000F (based on review of recent temperature data provided to B&W by IPSC). I also stated that the 1350 alarm temperature for the rear register plate is still OK with B&W. Since that time, I have discussed this further with B&W Engineering and would like to re-affirm B&W's recommendations as follows:

BURNER COMPONENT	MAX ALARM TEMPERATURE
Reg. Plts & Thrt Slvs	1350F
Coal Pipe	1050F

Of course, any reduction in burner metal temperatures will reduce the thermal expansion of corresponding parts and should be considered. A quick review of the burner temperature data in our files would suggest that both of the alarms above could be reduced by 25F or 50F without even changing the damper positions. However, unrestricted increases in cooling air for out-of-service burners has been shown to lower SH temperatures. To further optimize cooling air flow, B&W would strongly recommend that IPSC undertake a fine tuning program where the out-of-service damper position is opened gradually to find the maximum air flow setting which will not adversely affect steam temperature, and then lower the burner alarms correspondingly. If the alarm system allows, IPSC could even vary alarm settings burner by burner, allowing use of still lower alarms on lower level and end-of-row burners. B&W would be glad to review and comment on any data taken by IPSC, should they embark on such a program.

In summary, Babcock & Wilcox has stood behind IPP's burners in the past by making extensive modifications to improve operability and extend life. We fully intend to complete this warranty period with the confidence that IPP's burners will continue to provide effective service for many years with only minimal maintenance costs.

Please advise any questions or comments.

Very truly yours,

C.A. Palmberg
Contract Manager

CAP5007:nk

cc: RK Krikorian - IPP, LA w/attach.
GT Rose - IPP, Delta w/attach.

C. A. PALMBERG

MAY 16 1990

Babcock & Wilcox
a McDermott company

To	C. A. PALMBERG - PROJECT MANAGEMENT - BVCB3K
From	D. A. OYLER - COMBUSTION SYSTEMS - BVNO1C
Cust.	INTERMOUNTAIN POWER PROJECT - UNITS #1 & #2
Subj.	BURNER INSPECTION REPORT - INTERMOUNTAIN POWER PROJECT

BDS 663-8

File No. or Ref. RB-614/615

Date MAY 15, 1990

This letter to cover one customer and one subject only.

This report covers the recent spring boiler outage for both Units #1 & #2. The objective on the burner issues was in two parts. The first, was to install a new design slip seal casing (seal ring between the burner and furnace wall) on all 96 burners. New throat sleeve retaining clips were also added to all 96 burners. These clips were added to maintain throat sleeve concentricity with burner register front plate opening. These items will be inspected and evaluated during the next outages. The second, was to thoroughly inspect all 96 burners and make repairs of these burners as necessary. A detailed report of these findings are as follows.

UNIT #1, BURNERS

Outer Registers - All registers were measured from register front plate (closest plate to water wall) to the furnace wall tubes at four points, 3:00, 6:00, 9:00, and 12:00 o'clock positions. These dimensions were noted on the individual burner inspection sheets and will be verified during the next outages, fall 1990 and spring 1991. Deviations of these dimensions will be noted and evaluated at that time.

The overall appearance of these registers varied from structurally intact as designed to somewhat less than desired. The top row of registers, front and rear walls (new HD registers) were all in good condition with the exception of three registers where the register back plates (furthest from tube wall) had a slight bow.

Out of the total of 48 registers, 30 were found in good condition, with no repairs needed. On one register assembly (burner C-4), both register plates were bowed and had broken welds on support bars between register plates. This register needed to be rebuilt and straightened. On 6 register assemblies, front and back plates were slightly bowed and had broken welds on the support bars. These were rewelded. The slight bowing of the registers did not affect the operation of the registers. On 7 other register assemblies, the register plates were slightly bowed only. No repair was needed as the operation of the registers were not affected. On 4 register assemblies, there were some broken or cracked welds on the support bars. These bars were rewelded.

Outer Register Doors - The top row of burners (HD registers) are in excellent condition with three burners having very slight warpage on the tips of the doors. All of the remaining burners had slight warpage on the air doors. This warpage, however, should not have any adverse effect on the functional or mechanical reliability of these doors. On one burner, there was some exfoliation noted on the tips of the air door support bars. This will be checked during the next outage for any further damage.

Throat Sleeves - All the throat sleeves had slight warpage. The ends of the throat sleeves were held at the original diameters, where as the center of the sleeves were bowed out from approximately 1/2" to 1" in diameter. This bowing should not have any adverse effect on the flow of air through the throat sleeves. No exfoliation of metal was noted on any of these sleeves.

Slip Seal Casing - All the slip seal casings were warped and twisted and had broken welds around the circumference of these casings. All new design casings were installed except the bottom row of burners. These casings were not warped nearly as bad. These casings were straightened and reused. The outside attachment ring was removed from these casings and reattached to the throat rings with the use of gusset plates (8 per casing) this is the same method of attachment as the new slip seal casings provided on the other burners.

Slip Seal Casing Packing - The packing for the slip seal casings was removed. These will not be reinstalled as it was determined that the air leakage past the slip seal and throat sleeve will help the cooling of the slip seal and throat sleeve. This air leakage will not have any functional operational effect on the burners or boiler.

Coal Nozzles - Three coal nozzles, burners G-2, G-3, and G-5 had extensive damage due to coal nozzle fires. The alloy nozzle tips were egg shaped. These coal nozzles were replaced during this outage. The coal nozzles on burners B-2 and B-4 also had damaged nozzle tips and should be replaced during the next outage. Burner coal line balancing should be investigated on these two mill groups of burners.

Spin Vanes - The spin vanes appeared to be in satisfactory condition. Three vanes on burners G-2 and G-5 were bent down and had to be straightened due to coal nozzle sagging down on them. One spin vane gear assembly had a missing spring clip which allowed the bottom gear to disengage with the top gear and allowed the spin vane to rotate freely. This was corrected during this outage.

The positions of the spin vanes were noted and will be rechecked during the next outages. Penetrating oil was sprayed on vane linkages and gears.

Zone Discs - The zone discs appeared to be in satisfactory condition with the exception on three burners, the discs were bent and cocked. These were corrected during this outage. One burner had one broken control rod to the disc, this was also corrected.

The positions of these discs were noted and will be rechecked during the next outages.

Outer Register Linkage - On burners H-1 through H-6 and A-1 through A-6, these registers had a spring installed on one of the linkages during a previous outage for testing. The springs did not help the operation of the register doors as had hoped. The springs were replaced during this outage with new linkages.

The balance of the register linkage was in satisfactory condition. Penetrating oil was sprayed on linkages and adjusted as necessary. All the registers were manually stroked and operated freely.

Oil Lighter Support Sleeve - All the lighters had previously been installed with a support sleeve at the furnace end of the lighter. This was intended to aid in the cooling of the lighters tips. A "U" type clamp had been installed on the end of each support sleeve and welded to the air sleeve. This was found to be warping and causing problems with lighter insertion. A second "U" strap was added 12" further back for additional support. This was determined to also cause problems with warpage and alignment. It was decided to cut the front "U" strap loose and only attach by the rear strap. This will be evaluated during the next outage.

The balance of the burners and their components were in very satisfactory condition.

The existing thermocouples and their positions were noted on the burner work sheets for future reference.

UNIT #2, BURNERS

Outer Registers - All registers were measured from register front plate (closest plate to water wall) to the furnace wall tubes at four points, 3:00, 6:00, 9:00, and 12:00 o'clock positions. These dimensions were noted on the individual burner inspection sheets and will be verified during the next outages, fall 1990 and spring 1991. Deviations of these dimensions will be noted and evaluated at that time.

The overall appearance of these registers varied from structurally intact as designed to somewhat less than desired. Out of the total of 48 burners, 40 were found in good condition with no repairs needed. On 6 registers, the register was tilted back from the wall tubes 1"-2". These were corrected during this outage. On 2 registers, the front and back plates were warped and distorted. The register was straightened as much as possible, but still remained slightly distorted. The operation of these register doors was not affected by the distortion.

Outer Register Doors - All the register doors had slight warpage on the tips of the doors. This warpage, however, should not have any adverse effect on the functional or mechanical reliability of these doors.

Throat Sleeves - All the throat sleeves had slight warpage. The ends of the throat sleeves where held at the original diameters, where as the center of the sleeves were bowed out from approximately 1/2" to 1" in diameter. This bowing should not have any adverse effect on the flow of air through the throat sleeves. No exfoliation of metal was noted on any of these sleeves.

Slip Seal Casing - All the slip seal casings were warped and twisted and had broken welds around the circumference of these casings. All new design casings were installed on the burners. These casings were attached to the throat rings with the use of gusset plates.

Slip Seal Casing Packing - The packing for the slip seal casings was removed. These will not be reinstalled as it was determined that the air leakage past the slip seal and throat sleeve will help the cooling of the slip seal and throat sleeve from the furnace high temperatures. This air leakage will not have any functional operational effect on the burners or boiler.

Coal Nozzles - One coal nozzle tip was found egg shaped, burner D-3. The coal nozzle showed signs of deformation. This nozzle should be replaced during the next outage There were six nozzle tips found with cracked and broken seam welds. These were rewelded during this outage.

Spin Vanes - The spin vanes appeared to be in satisfactory condition. The position of the spin vanes were noted and will be checked during the next outages. Penetration oil was sprayed on vane linkage and gears.

Zone Discs - All the zone discs were in satisfactory condition except for two discs. These were found warped and crooked. These discs were straightened during this outage. The positions of these discs were noted and will be rechecked during the next outage.

Outer Register Linkage - All the register linkage was in satisfactory condition. Penetrating oil was sprayed on the linkages and adjusted as necessary. All the registers were manually stroked and operated freely.

Oil Lighter Shields - Eight lighter shields were found half burnt off. These were replaced during this outage.

Oil Lighter Support Sleeve - All the lighters had previously been installed with a support sleeve at the furnace end of the lighter. This was intended to aid in the cooling of the lighters tips. A "U" type clamp had been installed on the end of each support sleeve and welded to the air sleeve. This was found to be warping and causing problems with lighter insertion. A second "U" strap was added 12" further back for additional support. This was determined to also cause problems with warpage and alignment. It was decided to cut the front "U" strap loose and only attach by the rear strap. This will be evaluated during the next outage.

Also, two of these lighter support sleeves had a missing centering bar in bottom of the sleeve. These were replaced during this outage. A third support sleeve was drooping down at the furnace end, causing a problem with lighter insertion. This was repositioned during this outage.

A fourth support sleeve was located too far inside of the air sleeve causing a interference with the burner zone disc. This was also relocated during this outage.

The balance of the burners and their components were in very satisfactory condition.

The existing thermocouples and their positions were noted on the burner work sheets for future reference.

In summary, these burners have incurred damage from excessive thermal expansion which has apparently resulted from periods when cooling air was flow inadequate. Modifications have been made to certain components and attachments to allow for additional expansion which should minimize future maintenance. The burners are structurally sound and no functional problems with the burners, as repaired, are anticipated. The burners will be further evaluated during outages in fall 1990 and spring 1991.

D. A. Oyler

D. A. Oyler

DA0001/lak
cc: P. L. Cioffi